BRITISH COLUMBIA DEPARTMENT OF MINES
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BULLETIN No. 20—PART VI.

LODE-GOLD DEPOSITS

North-eastern British Columbia and Cariboo and Hobson Creek Areas

by

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VICTORIA, B.C.:
Printed by CHARLES F. BANFIELD, Printer to the King's Most Excellent Majesty.
1944.

PREFACE.

Bulletin 20, designed for the use of those interested in the discovery of gold-bearing lode deposits, is being published as a series of separate parts. Part I. is to contain information about lode-gold production in British Columbia as a whole, and will be accompanied by a map on which the generalized geology of the Province is represented. The approximate total production of each lode-gold mining centre, exclusive of by-product gold, is also indicated on the map. Each of the other parts deals with a major subdivision of the Province, giving information about the geology, gold-bearing lode deposits, and lode-gold production of areas within the particular subdivision. In all, seven parts are proposed:—

PART I.—General *re* Lode-gold Production in British Columbia.
PART II.—South-eastern British Columbia.
PART III.—Central Southern British Columbia.
PART IV.—South-western British Columbia, exclusive of Vancouver Island.
PART V.—Vancouver Island.
PART VI.—North-eastern British Columbia, including the Cariboo and Hobson Creek Areas.
PART VII.—North-western British Columbia.

By kind permission of Professor H. C. Gunning, Department of Geology, University of British Columbia, his compilation of the geology of British Columbia has been followed in the generalized geology represented on the map accompanying Part I. Professor Gunning's map was published in "The Miner," Vancouver, B.C., June–July, 1943, and in "The Northern Miner," Toronto, Ont., December 16th, 1943.

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NORTH-EASTERN BRITISH COLUMBIA.

INTRODUCTION.

The part of the Province treated as North-eastern British Columbia in this publication lies to the east of a rather indefinite line extending south-eastward from Teslin Lake past the south end of Dease Lake, the south-western end of Thutade Lake to the head of Takla Lake; thence down Stuart Lake and River and south-eastward up the Fraser River to Yellowhead Pass. The region is divided into two distinctly different parts by the Rocky Mountain Trench which extends in an almost straight line from Lower Post on the Liard River to Tete Jaune near the head of the Fraser River. The Trench is a continuous, major valley occupied from north to south by the Kechika, Fox, Finlay, Parsnip, and Fraser Rivers.

In the area immediately east of the Trench, the Rocky Mountains occupy a belt having a maximum width of about 75 miles and extending north-westward from Yellowhead Pass to their northern termination near the Liard River. The northern continuation of the Plains Region of Alberta lies to the east of the mountains. The surface of the high plains stands at an elevation of 4,000 to 4,500 feet near the mountain front but farther to the east becomes progressively lower.

The Cassiar-Omineca Mountain system lies to the west of the Trench. The mountains of this system extend north-westward from the Nation Lakes, through the headwaters of the Finlay, Stikine, Turnagain, and Dease Rivers to the east side of Teslin Lake. The eastern margin of the system is sharply bounded by the Trench, whereas on the western side the margin is less known and less sharply defined and the mountains become progressively lower, merging by transition into other mountains extending farther westward or into high plateau areas.

The mountain system between Teslin and Nation Lakes occupies a belt about 50 to 60 miles wide and about 450 miles long. Some summits, in the highest part of the system between the head of the Finlay and the Turnagain Rivers, have elevations in excess of 8,000 feet.

ACCESSIBILITY.

It is possible one way or another to reach most parts of the whole region. On the other hand pack-trails are few, the distances from organized transportation by road, rail, or boat are generally large, and the slowness and difficulty of travel make transportation costs high. It is well, therefore, to consider this one factor "transportation" before selecting any area for prospecting. Moreover, it should be realized that the high cost of transportation necessitates the prospecting for deposits only of the highest grade or of sufficient size to justify the improvement of present facilities.

A large part of North-eastern British Columbia is accessible from the travel route along the Rocky Mountain Trench. Summit Lake, at the head of the Crooked River, is reached by 32 miles of road from Prince George. From Summit Lake power-driven, shallow-draught boats may be taken down the Crooked, Pack, and Parsnip Rivers to Finlay Forks; thence up the Finlay River to Fort Ware at the junction of Fox River. At certain stages of water a half-mile portage must be made at Deserters Canyon, about 25 miles north of Fort Grahame. Fox River is navigable with difficulty for 23 miles above its mouth. From Fort Ware a good pack-horse trail runs northward along Fox River to Sifton Pass, elevation 3,273 feet; thence down Kechika River to the junction of the Turnagain River. There the trail crosses to the west side of the Turnagain and continues through to Lower Post on the Liard. From Lower Post boats

may be taken down the Liard River to the mouth of the Turnagain River, up the Turnagain to the junction of the Kechika, and then up the Kechika to Driftpile Creek only 5 miles north of Sifton Pass. The Turnagain is navigable for only a few miles above its junction with the Kechika.

From the Trench at Chee House at the mouth of Kechika River an old pack-horse trail crosses the mountains to Muncho Lake, and formerly ran through to Fort Nelson. A second trail crosses the Rocky Mountains running from Fort Ware up Kwadacha River; thence through the mountains to the head of the Muskwa River where it joins a pack-horse trail, used by hunting parties, that runs northward from the Peace River.

It is possible to travel westward from the Trench along several routes. The Ingenika River is navigable by boat for 30 to 40 miles above its mouth. A pack-horse trail runs westward through the mountains up Bower Creek to Fishing Lake; thence farther west to connect with a trail running through to Telegraph Creek. Another trail runs up Turnagain River, from its junction with the Kechika, to Deadwood Lake, whence one branch trail leads to McDame Creek and the other continues up to the head of the Turnagain River and through to Dease Lake.

The Alaska Highway affords access to a considerable area not readily reached formerly. The Alaska Highway starts at Dawson Creek, the northern terminus of the Northern Alberta Railways, about 500 miles by road from Edmonton. From Dawson Creek the highway runs 49 miles north to Fort St. John; thence a farther 256 miles northward along the east side of the Rocky Mountains to Fort Nelson at the junction of the Muskwa and Fort Nelson Rivers. From Fort Nelson the highway runs westward up the Muskwa and Tetsa Rivers to Muncho Lake and down Trout River to the Liard River bridge at Mile 210 from Fort Nelson. From the Liard River bridge the highway runs along the north side of the river to Lower Post; thence westward to Teslin Post on the east side of Teslin Lake. The highway between Lower Post and Teslin Lake is close to the north-eastern side of the Cassiar Mountains.

Another route, used to gain access to the Cassiar Mountains, is by way of coast steamship to Wrangell, Alaska; thence up the Stikine River to Telegraph Creek, the head of navigation. From Telegraph Creek a pack-horse trail runs east and south, making it possible to take pack-horses through along the western flank of the mountains to the head of Takla Lake. A truck-road runs from Telegraph Creek to the head of Dease Lake, whence boats may be taken down Dease Lake and Dease River to Lower Post. Lower Post is on the Alaska Highway, about 650 miles from Dawson Creek.

In the Omineca area a road runs 140 miles north from Fort St. James to Germansen Landing on the Omineca River; whence a winter road has been cut through to Aiken Lake, about 95 miles farther north.

COUNTRY LYING TO THE WEST OF THE ROCKY MOUNTAIN TRENCH.

Geology.

A batholith intrusion belt coincides approximately with the central part of the Cassiar-Omineca Mountain system. Starting with the batholith exposed to the south of Germansen Lake other areas of batholithic rocks are known to outcrop by Silver Creek on the Omineca River, at the heads of the Osilinka, Mesilinka, and Ingenika Rivers, and at Fishing Lake near the head of Finlay River. The extent of the Cassiar batholith is somewhat better known. The eastern contact is mapped from a point close to Sifton Pass to Cottonwood River (a tributary of Dease River), and the western margin from the head of Turnagain River to Teslin Lake.

The batholith belt is not completely mapped, but present knowledge suggests that it is a zone of intrusives of different kinds and ages, that there are outlying satellitic bodies associated with it, that batholithic rocks are not continuously exposed from one end of the belt to the other, and that the batholith rocks contain extensive roof-pendants of older sedimentary and volcanic rocks.

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The intrusive rocks are exposed across widths of 20 to 25 miles. They range in type from granite through granodiorite and quartz diorite to diorite and minor amounts of more basic rocks. The granitic intrusives cut both Palæozoic and Mesozoic sedimentary and volcanic rocks. Few, if any, Cretaceous rocks are known, and Tertiary and later volcanics and sediments are all younger than the batholiths. The batholiths are considered to be mainly or entirely Mesozoic. The granitic rocks are flanked by a considerable variety of types. In many places along the eastern margin, from Wolverine Mountains to the head of Jennings River, the older sediments and volcanics are metamorphosed to slates and schists and gneisses of various kinds.

Evidence of Mineralization.

Mineralization has been found at various places in the Cassiar-Omineca Mountain system and is considered to have accompanied the batholithic intrusions. No lode-gold mines have been developed and even the number of known mineral occurrences is small in comparison to the size of the area.

Claims near Uslika and Aiken Lakes have been staked on veins carrying values in gold, copper, silver, lead, and zinc. Of eight properties, all held by the Consolidated Mining and Smelting Company, the *Croydon* at Aiken Lake has had the most exploratory work done on it.

Farther north a number of lead-zinc deposits in limestone centre around the *Ingenika* mine (*Ferguson*) on the lower part of the Ingenika River. Gold-bearing quartz veins are reported in the neighbourhood of Thutade Lake and a number of veins have been found by prospectors on Bower and Ruby Creeks at the head of the Finlay River.

Copper-bearing float has been found at various places along the eastern contact of the batholith between Sifton Pass and Turnagain River and along the western contact between Teslin River and Tanzilla River. Gold-bearing quartz veins have been found on McDame Creek.

Placer-gold deposits result from the preservation of gold concentrated during the erosion and weathering of gold-bearing rocks. Although gold placers by no means indicate the existence of high-grade gold-bearing veins, nevertheless they do point to the existence of gold mineralization in the areas in which the placers are found.

By far the richest gold placers were those on McDame, Dease, and Thibert Creeks. Other gold-bearing placers have been worked at the following places: Goldpan, Wheaton (Boulder), and Walker Creeks in the Cassiar; at McConnell Creek near the head of Ingenika River; at Jimmay Creek; and at Vital, Tom, Germansen, Slate, and Manson Creeks in the Manson Creek belt; and bar gold has been found in the Kechika, Finlay, Mesilinka, Osilinka, and Omineca Rivers.

Actually it is only at McDame Creek that gold-quartz veins have been found close to related gold-bearing placers. These veins range in width from 1 to 9 feet, are of quartz carrying small amounts of pyrite, chalcopyrite, tetrahedrite, and specks of free gold. They are in sedimentary and volcanic rocks near the eastern margin of the Cassiar batholith and up-stream from the rich placer section of the creek.

Other gold-quartz veins are described from the *Croydon* group near Aiken Lake.

Prospecting Possibilities.

It is not possible, in the light of a few imperfectly known lode-gold deposits, to make any generalizations of specific value regarding the occurrence of lode-gold deposits in the Cassiar-Omineca system. Nor is it possible to point to particular areas that have greater known prospecting possibilities than others. Actually the more accessible, more prospected, and better known areas, on the basis of known discoveries, do not appear overly attractive for lode-gold prospecting. Yet it should be pointed out that only a very few parts of the whole area have been prospected and, of these, few places

have received intensive prospecting, so that much virgin ground awaits the prospector's attention. These least prospected areas are also the least accessible; accordingly, under present conditions mining operations would be expensive or probably prohibitive, unless extraordinarily rich or very large deposits were found.

The two most accessible areas are adjacent to the Omineca River and Manson Creek road, and adjacent to Dease Lake and Dease River. These are old placer areas where hundreds of placer prospectors were active sixty to seventy years ago. It would take exceedingly close prospecting to make a discovery that had not previously been found since placer prospecting began.

COUNTRY LYING TO THE EAST OF THE ROCKY MOUNTAIN TRENCH.

Geology.

The Rocky Mountains consist of an exceedingly thick succession of folded and faulted sedimentary rocks ranging in age from possibly Precambrian to Cretaceous. The plains to the east are underlain by flat or gently eastward-dipping Cretaceous and Tertiary sedimentary rocks. With the exception of some basaltic dykes observed by McConnell on Liard River, between the Turnagain and Rabbit Rivers, there are no known intrusive rocks in the Rocky Mountains north of Yellowhead Pass. The only rocks that suggest that intrusives might be near-by are the schists mapped by Dolmage along the east side of Finlay River, between Finlay Forks and Fox River.

Evidence of Mineralization.

There is very little evidence of ore mineralization in the rocks of the area east of the Trench. Known occurrences are of small lead-zinc veins just south of Grant Brook, near Yellowhead Pass, and copper veins east of the Trench about 20 miles north of Fort Grahame (small copper veins are reported in the area between Akie River and the head of the Ospika). Copper mineralization is reported to have been found near the mouth of Gataga River, and an unpublished map showing the explorations of E. B. Hart in 1913 and 1914 indicates that copper and galena float were found on Toad River, 15 to 20 miles south of Muncho Lake.

Although placer gold has been found on the bars of the Parsnip, Finlay, and Peace Rivers, no placer gold is known in any of the tributaries draining into them from the Rocky Mountains. Moreover, it is reported that no colours are found by panning creeks draining the east side of the Rocky Mountains in British Columbia.

No mineralization is known to occur in the Plains Region east of the Rocky Mountains.

The absence of known placer- and lode-gold deposits in the Rocky Mountains and Plains, together with the lack of known intrusive rocks, indicate that the part of British Columbia lying east of the Rocky Mountain Trench between Lower Post and Tete Jaune is not an attractive region for lode-gold prospecting.

REFERENCES.

Country West of the Rocky Mountain Trench.

Mandy, J. T. (1935): McDame Creek area—*Minister of Mines, B.C.*, Ann. Rept., pp. B 12–B 22.

——— (1937): McDame Creek area—*Minister of Mines, B.C.*, Ann. Rept., pp. B 25–B 37.

Hanson, G., and McNaughton, D. (1936): Eagle-McDame Creek area—*Geol. Surv., Canada*, Mem. 194.

Kerr, F. A. (1925): Dease Lake area—*Geol. Surv., Canada*, Summ. Rept., Pt. A.

Johnston, W. A. (1925): Gold Placers of Dease Lake area—*Geol. Surv., Canada*, Summ. Rept., Pt. A.

WATSON, K. D., and MATHEWS, W. H. (about to be printed): Tuya-Teslin area—*B.C. Dept. of Mines*, Bull. 19.
HOLLAND, S. S. (1940): Turnagain River area; placer gold, Wheaton Creek—*B.C. Dept. of Mines*, Bull 2.
HEDLEY, M. S., and HOLLAND, S. S. (1941): Turnagain and Upper Kechika Rivers area—*B.C. Dept. of Mines*, Bull. 12.
DOLMAGE, V. (1927): Finlay River district—*Geol. Surv., Canada*, Summ. Rept., Pt. A.
MCCONNELL, R. G. (1894): Finlay and Omineca Rivers area—*Geol. Surv., Canada*, Ann. Rept., Vol. VII.
LAY, D. (1940): Aiken Lake area—*B.C. Dept. of Mines*, Bull. 1.
——— (1932): McConnell Creek placer area—*B.C. Dept. of Mines*, Bull. 2.
KERR, F. A. (1933): Manson River and Slate Creek placers—Summ. Rept., Pt. A.
LANG, A. H.: Manson Creek; Preliminary map 42-2, Dept. of Mines and Resources, Ottawa.
ARMSTRONG, J. E.: Takla area; Preliminary map 42-7, Dept. of Mines and Resources, Ottawa.
——— Pinchi Lake mercury belt; Paper 42-11, Dept. of Mines and Resources, Ottawa.
——— Northern Part, Pinchi Lake, mercury belt; Paper 44-5, Dept. of Mines and Resources, Ottawa.
——— Fort Fraser Sheet, maps 630A and 631A, Dept. of Mines and Resources, Ottawa.

COUNTRY EAST OF THE ROCKY MOUNTAIN TRENCH.

MCCONNELL, R. G. (1894): Finlay and Omineca Rivers area—*Geol. Surv., Canada*, Ann. Rept., Vol. VII.
——— (1888–89): Yukon and Mackenzie basin area—*Geol. Surv., Canada*, Ann. Rept., Vol. IV.
DOLMAGE, V. (1927): Finlay River district—*Geol. Surv., Canada*, Summ. Rept., Pt. A.
HEDLEY, M. S., and HOLLAND, S. S. (1941): Turnagain and Upper Kechika Rivers area—*B.C. Dept. of Mines*, Bull. 12.

CARIBOO AND HOBSON CREEK AREAS.

CARIBOO.

The bulk of the placer- and lode-gold production of the Cariboo has come from the area around Wells, Barkerville, and Keithley Creek. The area described in the following summary is about 30 miles long, from Willow River and lower Lightning Creek south-eastward through to Cariboo River, and about 20 miles wide, from Quesnel Forks north-eastward to Cunningham Creek. In this area are the two producing gold Mines of Cariboo Gold Quartz Mining Company, Limited, and Island Mountain Mines Company, Limited, near Wells, as well as the former producer of Cariboo Hudson Gold Mines, Limited, 18 miles south-east of Barkerville. It is a mountainous area, having summits rising to elevations of 6,000 feet or more lying in the transitional belt between a range of higher and more rugged mountains to the east and a lower more subdued plateau area to the west. The relief is only about 2,000 feet, but the extensive mantle of drift and the vegetation obscure much of the bed-rock, so that natural exposures are not abundant and prospecting is difficult.

Accessibility.

The area is reached from Quesnel by motor-road, 59 miles to Wells; thence 21 additional miles to the Cariboo Hudson mine camp, whence a tractor-road leads across the Snowshoe Plateau to Yanks Peak, which is connected by a tractor-road with Keithley Creek. A motor-road runs from Williams Lake, 74 miles, into Keithley Creek. Much of the area is readily reached from the existing main roads and those into mine camps. A considerable number of trails ran through other sections, but through disuse have fallen into various stages of disrepair.

History.

The mining history of the Cariboo area began with the discovery of rich, gold-placer deposits at Quesnel Forks, Keithley Creek, and Antler Creek in 1860, and on Williams and Lightning Creeks in 1861. Once the discovery of these four most important creeks was made, thousands of miners found their way into the country over the trail from Quesnel Forks up Keithley Creek and across the summit to Antler Creek; thence through to Barkerville and Stanley on Williams and Lightning Creeks. They prospected and worked the placer ground and in the course of their prospecting for placer found many gold-bearing quartz veins.

Between 1875 and 1895 many gold-quartz veins were found and staked, and mining companies were formed to work them. Stamp-mills were erected to treat the ore. These included a 4-stamp mill at Richfield on Williams Creek, a 10-stamp mill on Island Mountain near Jack of Clubs Lake, a Government reduction plant treating custom ore, and an arrastra on Lightning Creek treating ore from Burns Mountain. In the next few years interest waned and for three decades little was done on gold-quartz veins of the Cariboo. In the preceding period several veins had been explored by underground workings, but no profitable mine had been developed.

The Cariboo Gold Quartz Mining Company, Limited, was organized in 1927 to explore the veins on Cow Mountain south-east of Jack of Clubs Lake. The favourable development of this mine, together with the increased price of gold, brought a renewal of interest in the possibilities of the area, resulting in much prospecting and development between 1933 and 1938. The Cariboo Gold Quartz mine began producing gold in

1933 and the Island Mountain mine in 1934 and have operated continuously since then. The Cariboo Hudson mine produced gold in 1938 and 1939. Since 1933 more than 1,000,000 tons of ore averaging 0.41 oz. gold per ton have been mined, resulting in a total production of 465,000 oz. of gold. This amount, however, is only about one-sixth the total placer-gold production of the same region.

Geology.

The productive areas of the Cariboo are underlain by a thick succession of Precambrian sedimentary rocks called the Cariboo series, comprising the Richfield, Barkerville, and Pleasant Valley formations. The oldest formation, the Richfield, contains all the gold-quartz veins of importance. The Richfield formation is composed of quartzite, argillite, limestone, and rock-types gradational between them that have been metamorphosed to sericite schists, quartz sericite schists, graphitic schist, and slate. The Barkerville and Pleasant Valley formations which lie above the Richfield are composed largely of limestone and black argillite respectively.

The Cariboo series has been folded into a major anticline whose axis runs from Mount Borland on the east side of Cariboo Lake to Dragon Mountain near Stanley. A synclinal fold axis lies parallel to it and about 12 miles to the north-east. Jurassic volcanics and sediments of the Quesnel River group overlap the south-western limb of the anticline along a line running from Wingdam south-eastward through to Likely and Cedar Creek.

The most important development in the knowledge of the Cariboo geology has been the recognition and mapping of distinct members which make up the upper parts of the Richfield formation. From Island Mountain south-westward to Grouse Creek, five members—the Baker, Rainbow, B.C., Lowhee, and basal member—have been mapped. The Rainbow member consists of interbedded argillite and quartzite. On the Hudson claims and Roundtop Mountain four members—the Lostway, Roundtop, Bee, and Hudson—have been mapped. The middle part of the Hudson consists of impure quartzite. These lithological subdivisions are important because most of the productive veins between Island Mountain and Grouse Creek are found in the Rainbow member, while on the Cariboo Hudson claims the productive veins are in the middle part of the Hudson member.

On the north-east late Palæozoic sediments and volcanics of the Slide Mountain series lie on the north-eastern limb of the anticline and in the trough of the north-westerly plunging syncline.

The intrusive rocks of the area mainly lie to the east of the Barkerville gold belt. They are quartz porphyry and felsite sill and dykes of the Proserpine intrusives which cut the Cariboo series but are older than the Slide Mountain series; the Mount Murray diabase, gabbro, and diorite sills and dykes in the Slide Mountain series north of Mount Murray; and one large and several small quartz monzonite and diorite stocks intruding the Cariboo series east of Cariboo River.

It is not possible to correlate the members of the upper Richfield at Roundtop Mountain with those north-west of Grouse Creek. The rock-types undergo a lithologic change along their strike reflecting different conditions of sedimentation. Moreover, because of the changes in lithology that are known to have taken place along strike, there is no reason for believing that the Rainbow member will extend unchanged north-west of Island Mountain nor that the Hudson member will continue unchanged to the south-east of Cariboo River. Nevertheless, rocks of similar character or competency may be found to the north-west or to the south-east.

Structure.

The major structural element of the area is a broad anticlinorium whose axis trends north-west and runs from Mount Borland, past the east side of Yanks Peak to Mount Burdett; thence through Mounts Agnes, Pinkerton, Amador, and Nelson to

Dragon Mountain. In the section by Mount Pinkerton the anticlinal axis is nearly horizontal but farther to the north-west it plunges 10 degrees north-westward and at Dragon Mountain plunges 20 to 40 degrees north-westward. On the limbs are minor drag-folds of varying amplitude whose axial planes are overturned. Generally higher dips prevail on the north-east limb than on the south-west one.

Of minor importance is the synclinal axis, about 12 miles north-east of Mount Borland, trending north-westward by Kimball and Limestone Creeks east of Cariboo River.

The rocks are cut by north-easterly-striking and north-westerly-dipping normal faults, some of large displacement; e.g., the Willow River fault displaces the Cariboo-Slide Mountain contact 4 miles.

Strike-faults are the commonest type. They parallel the dip and strike of the beds, are of the normal type, and have a throw of 25 feet or less.

A number of northerly-striking faults cut the Cariboo series. These faults dip about 60 degrees east and offset the beds as much as 1,300 feet in the case of the Lowhee fault. Others recognized are named the Rainbow, Grouse, and Aurum faults.

Cleavage is developed in the rocks for the most part parallel to the regional strike and specifically parallel to the axial planes of the drag-folds.

Of most importance are pre-mineral fractures, many of which are occupied by quartz veins. The fractures are more abundant in certain of the more competent rocks—e.g., the Rainbow member. These fractures are grouped into three sets: those striking north-east, at right angles or transverse to the strike of the rocks; and those striking north-west parallel to the strike of the rocks. All the fractures parallel to and diagonally crossing the beds are occupied by quartz veins whereas not all, but many, transverse fractures are quartz-filled.

Mineral Deposits.

Mineral deposits in the Cariboo are of two types: quartz veins and replacement deposits in limestone. At the Island Mountain mine a pyritic replacement in limestone is mined; similar pyritic replacements on the Cariboo Gold Quartz ground are not mined; and elsewhere replacement deposits in limestone carrying mixed sulphides such as galena, sphalerite, pyrrhotite, etc., have been neither large enough nor valuable enough to be mined. Gold-bearing quartz veins constitute the bulk of the mineable mineral deposits of the Cariboo. The total of somewhat more than 1,000,000 tons to date has yielded 0.41 oz. of gold per ton.

The quartz veins are in Precambrian rocks (Richfield formation of the Cariboo series) and are pre-Mississippian (older than the Slide Mountain series) in age. The veins contain gold, pyrite, galena, arsenopyrite, scheelite, sphalerite, pyrrhotite, and also cosalite and bismuth-lead sulphide in a quartz and ankerite gangue. The gold content is not directly proportional to the amount of pyrite, but higher values in gold occur with the larger amounts of pyrite. Gold is especially abundant in the nests of bismuth-lead sulphide.

The veins occupy fractures that have developed in the host-rocks. Transverse veins are the most numerous, most are less than a foot wide but they range up to 6 feet in width. In general they are less than 150 feet long and rarely exceed 200 feet. Diagonal veins are less numerous, most are less than a foot wide. The average width of veins more than a foot wide is about 3 feet. They are somewhat longer than the transverse veins but rarely exceed 300 feet. Both vein types are vertical or steeply dipping.

The quartz veins are not related to the contact-zone of any exposed batholith, though a granitic intrusive may be buried at some depth beneath the region. The veins however do occur in belts. This idea was proposed by D. Lay (Annual Report, Minister of Mines, B.C., 1933), who on the basis of observed occurrences of known gold-quartz veins and on the distribution of the rich gold-bearing placers recognized

two belts. One extends from Island Mountain through Cow Mountain and Proserpine Mountain to Roundtop Mountain. Between Burns Mountain and Yanks Peak a second belt was proposed.

Why the veins are found in belts is not definitely known, but the first follows certain favourable members (Rainbow and middle Hudson) near the top of the Richfield formation, and the second lies close to and slightly east of the axis of the anticlinorium.

A detailed study of the first belt between Island Mountain and Grouse Creek has shown that the argillaceous quartzites have fractured more readily than other types of rock, consequently most of the quartz veins are in the Rainbow member. Similarly at the Cariboo Hudson mine the middle Hudson member is the one that fractures most readily. The character of the rock, together with that of the adjacent rocks, appears to be the controlling element in the localization of the quartz veins. Secondarily the development of local drag-folds or faults has localized fracturing in parts of the favourable members. The possibility is suggested that the localization of fractures within the belts may be related to cross-structures such as the Aurum, Lowhee, and Rainbow faults. Furthermore the transverse and diagonal veins at the Island Mountain and Cariboo Gold Quartz mines are well mineralized: the strike veins are not necessarily well mineralized, and in many instances may be barren. Veins occupying northerly-trending fault-zones are the best mineralized in the Keithley Creek area. The reason why some veins contain mineable amounts of gold while others are poor or barren has not been satisfactorily explained.

The hypothesis of a second belt extending between Burns Mountain and Yanks Peak is based on the occurrence of gold-quartz veins at both places, but none are known nor are any placer creeks found between them. It is possible that former gold placers were dispersed by glacial erosion, but that is unlikely. The existence then of a second belt is less certain than of the first.

Gold-quartz veins at Burns Mountain and Yanks Peak are in rocks of various kinds, not being restricted to a mapped or recognizable member of the Richfield formation. They are, however, close to the axis of the major anticline and consequently the fracturing may in some way be related to it.

Prospecting Possibilities.

The most favourable prospecting ground in the Cariboo is considered to be along the two belts, particularly in the sections where the richest gold placers were worked. However, Burns Mountain, Yanks Peak, and the entire belt from Island Mountain to Roundtop Mountain have been staked; therefore these sections contain very little open ground.

The extensive drift-cover makes prospecting difficult, particularly when further prospecting must rely on information gained from geological studies made by the prospector himself. It should be emphasized that previous prospecting involving the search for quartz outcrops has resulted in the finding of most exposures. Any further work must be directed towards the discovery of veins or vein zones that do not outcrop, either because they are blind or are covered by overburden. Consequently, further prospecting must be founded on sound geological principles and must be much more detailed than that already done.

Outside the two belts already mentioned the possibilities appear less attractive, mainly for the reason that no rich placers have been found elsewhere. Nevertheless, the main anticlinal structure does extend farther in both directions and on that basis should be worth investigation, but it must be realized that there is no assurance of the Rainbow member extending unchanged north-west of Island Mountain, nor the Hudson member extending unchanged south-east of Cariboo River.

Until information to the contrary is known the area adjacent to the several diorite and monzonite stocks by Black Stuart Mountain east of Cariboo River should be regarded as worth investigation.

Other places that offer prospecting possibilities of varying degrees of attractiveness are near the placer occurrences at Wingdam and Cedar Creek, and around Spanish Mountain.

The country between the productive area of the Cariboo and the mineral showings (Blue Ice property) at the head of Hobson Creek is largely unknown geologically. Nevertheless, it is fairly certain that the belt of Precambrian sediments extends between the two places. Despite the lack of known placer creeks in the area and without any knowledge to what extent the country has already been prospected it is believed that this intervening country is worth prospecting on the chance that there will be a repetition of geological and structural conditions favourable to the occurrence of gold mineralization.

REFERENCES.

Cariboo Area.

Johnston, W. A. (1921): Placer mining in Barkerville area—*Geol. Surv., Canada*, Summ. Rept., Pt. A.

——— (1922): Placer mining in Cedar Creek area—*Geol. Surv., Canada*, Pt. A.

Johnston, W. A., and Uglow, W. L. (1926): Placer and vein gold deposits of Barkerville—*Geol. Surv., Canada*, Mem. 149.

Hanson, G. (1933): Willow River map-area—*Geol. Surv., Canada*, Summ. Rept., Pt. A.

——— (1935): Barkerville gold belt—*Geol. Surv., Canada*, Mem. 181.

Cockfield, W. E. (1933): Willow River map-area—*Geol. Surv., Canada*, Summ. Rept., Pt. A.

Cockfield, W. E., and Walker, J. F. (1932): Geology and placer deposits, Quesnel Forks area—*Geol. Surv., Canada*, Summ. Rept., Pt. A 1.

Lang, A. H. (1938): Keithley Creek map-area—*Geol. Surv., Canada*, Paper 38-16.

Lay, D. (1932): Lode-gold deposits of B.C.—*B.C. Dept. of Mines*, Bull. 1.

——— (1935): Pre-Mississippian veins and deposits of the Cariboo—*Can. Inst. Min. and Met.*, pp. 475–477.

——— (1933): *B.C. Minister of Mines*, Ann. Rept., pp. 115–145.

Lay, D., Lang, A. H., and others (August, 1938): Articles regarding Cariboo area—*The Miner*, Gordon Black Publications, Ltd., Vancouver.

Maps with Marginal Notes.

Keithley Creek, Map 562A, Dept. of Mines and Resources, Ottawa, 1940.

Willow River Sheet (West Half), Map 335A, Dept. of Mines and Resources, Ottawa, 1938.

Willow River Sheet (East Half), Map 336A, Dept. of Mines and Resources, Ottawa, 1938.

Little River, Map 561A, Dept. of Mines and Resources, Ottawa, 1940.

Chisz Creek, Map 564A, Dept. of Mines and Resources, Ottawa, 1940.

Cariboo Mountain, Map 563A, Dept. of Mines and Resources, Ottawa, 1940.

HOBSON CREEK.

Gold mineralization has been found across the summits between the headwaters of Hobson Creek and Azure River. The first discoveries were made about 1914, and there has been a small amount of development but no production. The region is extremely rugged, with ice-capped peaks rising to elevations of more than 8,000 feet. The known showings can be reached by two routes: from Gosnell on the C.N.R. by 45 miles of trail up the North Thompson River valley and across a high pass to Azure River, or by about 18 miles of trail up Hobson Creek from Hobson Lake. A third possible route is up the Raush River about 50 miles, but a trail built some years ago is now largely obliterated.

The rocks are Precambrian sediments, chiefly quartzites, but including phyllites, argillites, and one or two bands of limestone. The rocks are compressed into north-westerly-trending folds but, as at the head of Azure River, there is some complex folding and perhaps major faulting. A body of granodiorite cuts these rocks about 2 miles south of the known mineralization.

The mineral deposits include quartz veins and replacement deposits in limestone. The veins are irregular and tend to be lenticular, but follow a clearly recognizable pattern in most instances. Where a stockwork or intersecting pattern of quartz veins occurs, the higher values are found to favour one direction of fracturing. At the head of Hobson Creek (Blue Ice property) the vein pattern is similar in general to that in the producing mines in the Cariboo, although here the rock is an impure quartzite. At the same locality there are replacement bodies of pyrite in a band of limestone. In the quartz veins there has been proved in a few instances an association of gold with sphalerite and galena, even though the amount of these minerals is extremely small.

In some parts of the area the size of the quartz veins varies greatly with the character of the wall-rock, this is particularly noticeable when the rocks are interbedded quartzites and phyllites. In other parts the rock section is uniform and the veins, although irregular, are apt to persist. It seems probable that certain belts of rock and certain parts of the folded structures are the best mineralized.

These deposits have some features in common with those of the Cariboo. The pattern of the quartz veining is not the same nor are the rocks identical, but there appears to have been a general similarity of conditions in the formation of the veins. Geological mapping is not complete and it is impossible to correlate directly the rocks at Hobson Creek with those in the Cariboo some 30 miles to the north-west. The conditions known to exist in the Cariboo and Hobson Creek areas suggest that the intervening ground is worth prospecting.

References.

Clearwater Lake map-area, B.C. (1927): *Geol. Surv., Canada*, Summ. Rept., Pt. A.
Clearwater Lake area, B.C. (1929): *Geol. Surv., Canada*, Summ. Rept., Pt. A.
Annual Report of the Minister of Mines, B.C., 1938, Pt. D.

VICTORIA, B.C.:
Printed by Charles F. Banfield, Printer to the King's Most Excellent Majesty.
1944.

750-844-2475